

IN THE CLAIMS:

- 1 1. (Original) A method for creating and maintaining a plurality of virtual servers within
2 a server, the method comprising the steps of:
3 partitioning resources of the server to establish an instance of each virtual server;
4 and
5 enabling controlled access to the resources using logical boundary checks and se-
6 curity interpretations of those resources within the server.
- 1 2. (Original) The method of Claim 1 wherein the step of partitioning comprises the steps
2 of:
3 allocating dedicated resources of the server to each instance of the virtual server;
4 and
5 sharing common resources of the server among all of the virtual servers.
- 1 3. (Original) The method of Claim 2 wherein the dedicated resources are units of storage
2 and network addresses of network interfaces of the server.
- 1 4. (Original) The method of Claim 3 wherein the common resources are an operating sys-
2 tem and a file system of the server.
- 1 5. (Original) The method of Claim 4 wherein the server is a filer and wherein the virtual
2 servers are virtual filers (vfilers).

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- 2 6. (Currently Amended) ~~The method of Claim 5 wherein the step of enabling comprises~~
3 ~~the step of~~ A method for creating and maintaining a plurality of virtual servers within a
4 server, the method comprising the steps of:
5 partitioning resources of the server to establish an instance of each virtual server
6 by allocating units of storage and network addresses of network interfaces of the server to
7 each instance of the virtual server, and sharing an operating system and a file system of
8 the server among all of the virtual servers;
9 enabling controlled access to the resources using logical boundary checks and se-
10 curity interpretations of those resources within the server; and
11 providing a vfiler context structure including information pertaining to a security
12 domain of the vfiler.
- 1 7. (Original) The method of Claim 6 wherein the step of allocating comprises the step of
2 providing a vfstore list of the vfiler context structure, the vstore list comprising pointers
3 to vfstore soft objects, each having a pointer that references a path to a unit of storage al-
4 located to the vfiler.
- 1 8. (Original) The method of Claim 7 wherein the step of allocating further comprises the
2 step of providing a vfnet list of the vfiler context structure, the vfnet list comprising
3 pointers to vfnet soft objects, each having a pointer that references an interface address
4 data structure representing a network address assigned to the vfiler.
- 1 9. (Original) The method of Claim 8 wherein the step of enabling further comprises the
2 step of performing a vfiler boundary check to verify that a vfiler is allowed to access cer-
3 tain storage resources of the filer.
- 1 10. (Original) The method of Claim 9 wherein the step of performing comprises the step
2 of validating a file system identifier and qtree identifier associated with the units of stor-
3 age.

1 11. (Original) The method of Claim 10 wherein the step of performing further comprises
2 the steps of:

3 for each request to access a unit of storage, using the identifiers to determine
4 whether the vfiler is authorized to access the unit of storage;
5 if the vfiler is not authorized to access the requested unit of storage, immediately
6 denying the request;
7 otherwise, allowing the request; and
8 generating file system operations to process the request.

1 12. (Original) A system adapted to create and maintain a plurality of virtual servers
2 within a server, the system comprising:

3 storage media configured to store information as units of storage resources, the
4 units of storage resources allocated among each of the virtual servers;

5 network interfaces assigned one or more network address resources, the network
6 address resources allocated among each of the virtual servers;

7 an operating system having a file system resource adapted to perform a boundary
8 check to verify that a request is allowed to access to certain units of storage resources on
9 the storage media, each virtual server allowed shared access to the file system; and

10 a processing element coupled to the network interfaces and storage media, and
11 configured to execute the operating and file systems to thereby invoke network and stor-
12 age access operations in accordance with results of the boundary check of the file system.

1 13. (Currently Amended) ~~The system of Claim 12 further comprising~~ A system adapted
2 to create and maintain a plurality of virtual servers within a server, the system compris-
3 ing:

4 storage media configured to store information as units of storage resources, the
5 units of storage resources allocated among each of the virtual servers;

6 network interfaces assigned one or more network address resources, the network
7 address resources allocated among each of the virtual servers;

8 an operating system having a file system resource adapted to perform a boundary
9 check to verify that a request is allowed to access to certain units of storage resources on
10 the storage media, each virtual server allowed shared access to the file system;

11 a context data structure provided to each virtual server, the context data structure
12 including information pertaining to a security domain of the virtual server that enforces
13 controlled access to the allocated and shared resources; and

14 a processing element coupled to the network interfaces and storage media, and
15 configured to execute the operating and file systems to thereby invoke network and stor-
16 age access operations in accordance with results of the boundary check of the file system.

1 14. (Original) The system of Claim 13 wherein the units of storage resources are volumes
2 and qtrees.

1 15. (Original) The system of Claim 14 further comprising a plurality of table data struc-
2 tures accessed by the processing element to implement the boundary check, the table data
3 structures including a first table having a plurality of first entries, each associated with a
4 virtual server and accessed by a file system identifier (fsid) functioning as a first key into
5 the table, each first entry of the first table denoting a virtual server that completely owns
6 a volume identified by the fsid.

1 16. (Original) The system of Claim 15 wherein the table data structures further include a
2 second table having a plurality of second entries, each associated with a virtual server and
3 accessed by a second key consisting of an fsid and a qtree identifier (qtreeid), each sec-
4 ond entry of the second table denoting a virtual server that completely owns a qtree iden-
5 tified by the fsid and qtreeid.

1 17. (Original) The system of Claim 16 wherein the server is a filer and wherein the vir-
2 tual servers are virtual filers.

1 18. (Original) Apparatus adapted to create and maintain a plurality of virtual filers (vfil-
2 ers) within a filer, the apparatus comprising:

3 means for allocating dedicated resources of the filer to each vfiler;
4 means for sharing common resources of the filer among all of the vfilers; and
5 means for enabling controlled access to the dedicated and shared resources using
6 logical boundary checks and security interpretations of those resources within the server.

1 19. (Original) The apparatus of Claim 18 wherein the means for enabling comprises
2 means for performing a vfiler boundary check to verify that a vfiler is allowed to access
3 certain dedicated resources of the filer.

1 20. (Currently Amended) ~~The apparatus of Claim 18 wherein the means for enabling~~
2 ~~comprises means~~ Apparatus adapted to create and maintain a plurality of virtual filers
3 (vfilers) within a filer, the apparatus comprising:

4 means for allocating dedicated resources of the filer to each vfiler;
5 means for sharing common resources of the filer among all of the vfilers; and
6 means for enabling controlled access to the dedicated and shared resources using
7 logical boundary checks and security interpretations of those resources within the
8 server and for providing a vfiler context structure including information pertain-
9 ing to a security domain of the vfiler.

1 21. (Original) A computer readable medium containing executable program instructions
2 for creating and maintaining a plurality of virtual filers (vfilers) within a filer, the execu-
3 table program instructions comprising program instructions for:

4 allocating dedicated resources of the filer to each vfiler;

5 sharing common resources of the filer among all of the vfilers; and
6 ~~enforeing~~ enabling access to the dedicated and shared resources using logical
7 boundary checks and security interpretations of those resources within the server.

1 22. (Original) The computer readable medium of Claim 21 wherein the program instruc-
2 tion for enabling comprises a program instruction for performing a vfiler boundary check
3 to verify that a vfiler is allowed to access certain dedicated resources of the filer.

1 23. (Currently Amended) ~~The computer readable medium of Claim 21 wherein the pro-~~
2 ~~gram instruction for enabling comprises a program instruction for~~ A computer readable
3 medium containing executable program instructions for creating and maintaining a plu-
4 rality of virtual filers (vfilers) within a filer, the executable program instructions compris-
5 ing program instructions for:

6 allocating dedicated resources of the filer to each vfiler;
7 sharing common resources of the filer among all of the vfilers; and
8 enabling access to the dedicated and shared resources using logical boundary
9 checks and security interpretations of those resources within the server and providing a
10 vfiler context structure including information pertaining to a security domain of the
11 vfiler.

Please add New Claims 24 *et seq.*

1 24. (New) Electromagnetic signals propagating on a computer network containing ex-
2 executable program instructions for creating and maintaining a plurality of virtual filers
3 (vfilers) within a filer, the executable program instructions comprising program instruc-
4 tions for:

5 allocating dedicated resources of the filer to each vfiler;
6 sharing common resources of the filer among all of the vfilers; and
7 enabling access to the dedicated and shared resources using logical boundary
8 checks and security interpretations of those resources within the server.

1 25. (New) Electromagnetic signals propagating on a computer network containing ex-
2 executable program instructions for creating and maintaining a plurality of virtual filers
3 (vfilers) within a filer, the executable program instructions comprising program instruc-
4 tions for:

5 allocating dedicated resources of the filer to each vfiler;
6 sharing common resources of the filer among all of the vfilers; and
7 enabling access to the dedicated and shared resources using logical boundary checks and
8 security interpretations of those resources within the server and providing a vfiler context
9 structure including information pertaining to a security domain of the vfiler.